

The following information is excerpted from the Delaware River Basin Commission's "2006 Delaware River and Bay Integrated List Water Quality Assessment" report. The full narrative report is in draft form and will be available soon. Please see DRBC's 2006 Integrated List Assessment Methodology for more information about the assessments presented in this section.

3.4 Delaware River and Bay Surface Water Quality Assessment for Years 2002-2004

The following section of the report presents the results of assessing the Delaware River and the tidal portions of its tributaries. The tables used to describe designated use support in this section only indicate those portions of the River and Bay that were either assessed as not supporting the designated use in question or did not have sufficient data to determine support of that designated use. The figures in this section display the level of use support, as assessed, for all portions of the River and Bay, whether or not they are supporting their designated uses.

3.4.1 Assessment of Designated Uses for Surface Waters

Aquatic Life Designated Use

The water quality parameters used in this assessment of the Aquatic Life Designated Use are pH, Temperature, Dissolved Oxygen, Alkalinity, Total Dissolved Solids or TDS and toxic parameter data (along with Chronic Toxicity) that were collected in Water Quality Zones 2-5. DRBC standards include temperature criteria for all portions of the River; however in-stream values only exist for Zones 2, 3 and 4. In other portions of the River, criteria are based upon the regulation of temperature increases, caused by effluent discharges, above background conditions. Those background conditions are not defined in Zones 1, 5 and 6.

The Aquatic Life designated use was assessed along the length of the Delaware River from Hancock, NY to the bottom of Zone 1 (202 miles), in Zones 2-5 of the Delaware Estuary (97 square miles), and in the Delaware Bay (693 square miles). Figure 3.7 depicts the level of Aquatic Life Use support in the Delaware River and Bay.

Non-Tidal River

The use was supported in 102 miles of the non-tidal river, or 50.4 %. The remaining 100 miles either had insufficient data or did not support the use. The following table explains the rationale behind the assessment decisions in those assessment units.

Table 3.12: Use Support Level Explained for Non-Tidal River AUs Not Assessed as Supporting Aquatic Life Use

AU	Use Support Level	Explanation
1A1	Not Supported	14.9% of samples exceeded the pH criterion
1A2	Not Supported	13.2% of samples exceeded the pH criterion
1A3	Insufficient Data	No readily-available Total Dissolved Solids data
1B1	Insufficient Data	No readily-available Total Dissolved Solids data
1B3	Insufficient Data	No readily-available Total Dissolved Solids data
1C1	Insufficient Data	No readily-available data
1C3	Insufficient Data	No readily-available Total Dissolved Solids data
1C4	Insufficient Data	No readily-available data
1D1	Insufficient Data	No readily-available Total Dissolved Solids data
1D2	Insufficient Data	No readily-available Total Dissolved Solids data
1D4	Not Supported	15.9% of samples exceeded the Total Dissolved Solids criterion
1D5	Insufficient Data	No readily-available data
1D6	Insufficient Data	No readily-available data
1E2	Probably Supported	No readily-available data but 1E1 and 1E2 support the Aquatic Life use

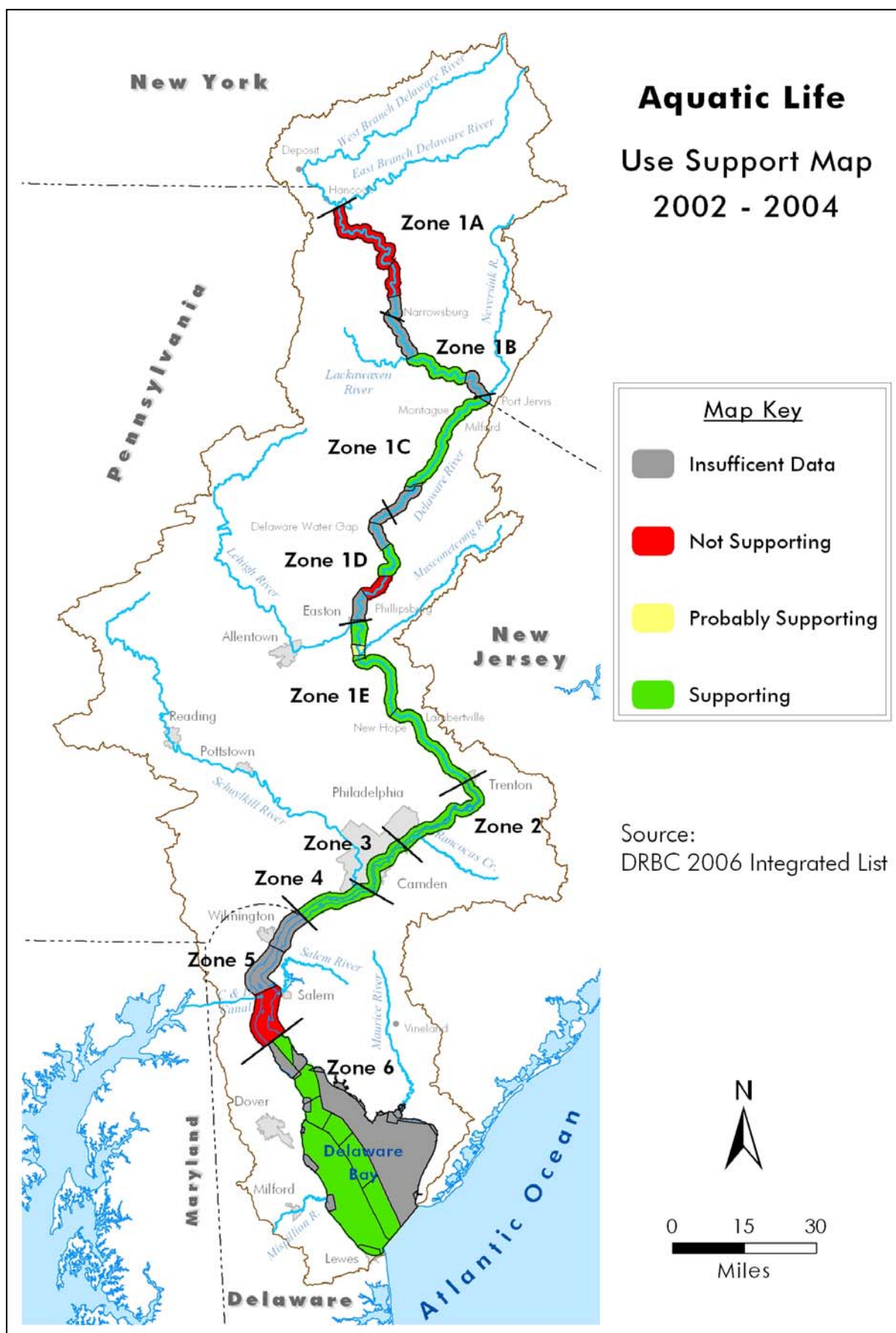
Estuary

The use was supported in Zones 2, 3 and 4 of the Estuary (32 square miles) and in 362 square miles of the Bay. The remaining 395 square miles either had insufficient data or did not support the use. The following table explains the rationale behind the assessment decisions in those assessment units.

Table 3.13: Use Support Level Explained for Estuary and Bay AUs Not Assessed as Supporting Aquatic Life Use

AU	Use Support Level	Explanation
5a	Insufficient Data	Insufficient DO data for 24-hour averages and seasons not well-represented
5b	Insufficient Data	Insufficient DO data for 24-hour averages and seasons not well-represented
5c	Not Supported	DO criterion not met in 13% of 24-hour averages
6br1a	Insufficient Data	No readily available data
6br2a	Insufficient Data	No readily available data
6br2c	Insufficient Data	No readily available data
6br2d	Insufficient Data	No readily available data
6br3a	Insufficient Data	No readily available data
6br3c	Insufficient Data	No readily available data
6de2	Insufficient Data	No readily available data
6de3	Insufficient Data	No readily available data
6de4	Insufficient Data	No readily available data
6nj1	Insufficient Data	Insufficient pH and Alkalinity data
6nj2-6nj7	Insufficient Data	No readily available data
6nj8	Not Supported	Insufficient pH and Alkalinity data
6nj10	Insufficient Data	No readily available data

Figure 3.7: Aquatic Life Use Support in the Delaware River and Bay, 2002-2004



Fish Consumption Designated Use

The assessment of Fish Consumption is not based on zones, but rather is based upon the presence of fish consumption advisories for the main stem Delaware River and the tidal portions of its tributaries. Tables 3.14 – 3.16 below indicate the portions of the River for which such advisories exist. Figure 3.8 shows how those advisories translate into use support for fish consumption in the Delaware River. All portions of the Delaware River and Bay were found to have fish consumption advisories in place and so were assessed as not supporting the Fish Consumption use. The pollutants most commonly resulting in fish consumption advisories were PCBs, Mercury and chlorinated pesticides.

Where no advisories are in effect, the water body is supporting the Fish Consumption use. Where restrictions exist on the amount of fish consumed in a given time period, or consumption advisories exist for susceptible populations, the water body is not supporting the use. New Jersey has developed a new methodology for making these advisories that has resulted in a two-tiered approach based upon risk level. For the purposes of this assessment, however, any advisory, regardless of risk level utilized, was used to indicate non-support of the use.

In total, all 202 miles of the non-tidal, mainstem Delaware River, all 97 square miles of the Estuary and all 686 square miles of the Bay were assessed for fish consumption. As described in the Assessment Methodology (see Section 3.3), only water-body specific advisories for particular contaminants are used for determining use support. Statewide advisories require more information.

Table 3.14: Fish Consumption Advisories for the Delaware River: Delaware, New York and Pennsylvania (Main Stem and Tidal Portions)

Issuing State	From RM	To RM	Locations	Species	Advisory	High Risk Advisory	Contaminant
NY ^a	330.71	253.6	Statewide (i.e., NY portion of mainstem Delaware River)	All Species	no more than 1/2 lb/week	do not eat ^b	Various
PA ^c	330.71	133.46	Source to Trenton/Morrisville Bridge	American Eel	2 meals/month		Mercury
PA	133.46	78.74	Trenton/Morrisville Bridge to PA/DE line	American Eel, Carp	Do Not Eat		PCBs
				White Perch, Striped Bass, Carp, Flathead Catfish, Channel Catfish	1 meal/month		PCBs
DE ^d	78.74	58.90	Delaware State Line to C&D Canal	All Finfish	do not eat		PCBs, Dioxin, Mercury, Chlorinated Pesticides
DE	58.90	0.00	C&D Canal to mouth of Delaware Bay	Striped Bass, Channel Catfish, White Catfish, American Eel, White Perch, Bluefish	no more than 1 8-oz. meal/year (including for Bluefish less than 24-inches. For Bluefish greater than 24-inches, do not eat.		PCBs, Mercury, Dieldrin
DE			Tidal Brandywine R., mouth to Baynard Blvd.	All Finfish	do not eat		PCBs
DE			Tidal Christina R., mouth to Smalley's Dam	All Finfish	do not eat		PCBs, Dieldrin
DE			Tidal White Clay Creek, mouth to Route 4	All Finfish	do not eat		PCBs
DE			C&D Canal, entire Canal in DE	All Finfish	do not eat		PCBs
DE			Shellpot Creek, Philadelphia Pike to Delaware River	All Finfish	do not eat		PCBs
DE			Appoquinimink River, Tidal Portions	All Finfish	no more than 1 8-oz. meal/year		PCBs, Dioxin
DE			Drawyers Creek, Tidal Portions	All Finfish	no more than 1 8-oz. meal/year		PCBs, DDT

^a NYS Department of Health 2005-2006 Health Advisories - Chemicals in Sportfish and Game

^b in NY, high risk individuals are women of childbearing age, infants and children under 15

^c Commonwealth of Pennsylvania Fish Consumption Advisories-2005

^d Delaware Division of Fish and Wildlife, Fish Consumption Advisories as of March, 2005

Table 3.15: Fish Consumption Advisories for the Delaware River: New Jersey (PCBs and Dioxins)

From RM	To RM	Locations	Species	Advisory for 1 in 10,000 Lifetime Cancer Risk Level	Advisory for 1 in 100,000 Lifetime Cancer Risk Level	High Risk Advisory Based on a Non-Cancer Risk ^b
253.60	0.00	Statewide	American Eel	4 meals/year	1 meal/year	Do Not Eat
			Bluefish > 6lbs/24"	4 meals/year	Do Not Eat	Do Not Eat
			Bluefish < 6lbs/24"	1 meal/month	1 meal/year	Do Not Eat
			Striped Bass	1 meal/month	1 meal/year	Do Not Eat
137.60	78.74	Delaware River, Easton/Phillipsburg to PA/DE border, including tributaries to head of tide	American Eel	4 meals/year	Do Not Eat	Do not eat
			Striped Bass	4 meals/year	Do Not Eat	Do Not Eat
			Channel Catfish	1 meal every 2 months	1 meal every 2 months	Do Not Eat
78.74	58.90	Delaware River, DE/PA line to C&D Canal	All Finfish	Do Not Eat	Do Not Eat	Do Not Eat
58.90	0.00	Delaware River, C&D Canal to mouth of Delaware Bay	Striped Bass, Channel Catfish, White Catfish, American Eel, White Perch	no more than one 8-oz. meal per year	no more than one 8-oz. meal per year	no more than one 8-oz. meal per year
48.20	0.00	Delaware Bay Tributaries	American Eel	1 meal/month	4 meals/year	4 meals/year

^a A Guide to Health Advisories for Eating Fish and Crabs Caught in New Jersey Waters, 2005

^b in NJ, high risk individuals include infants, children, pregnant women, nursing mothers and women of childbearing age.

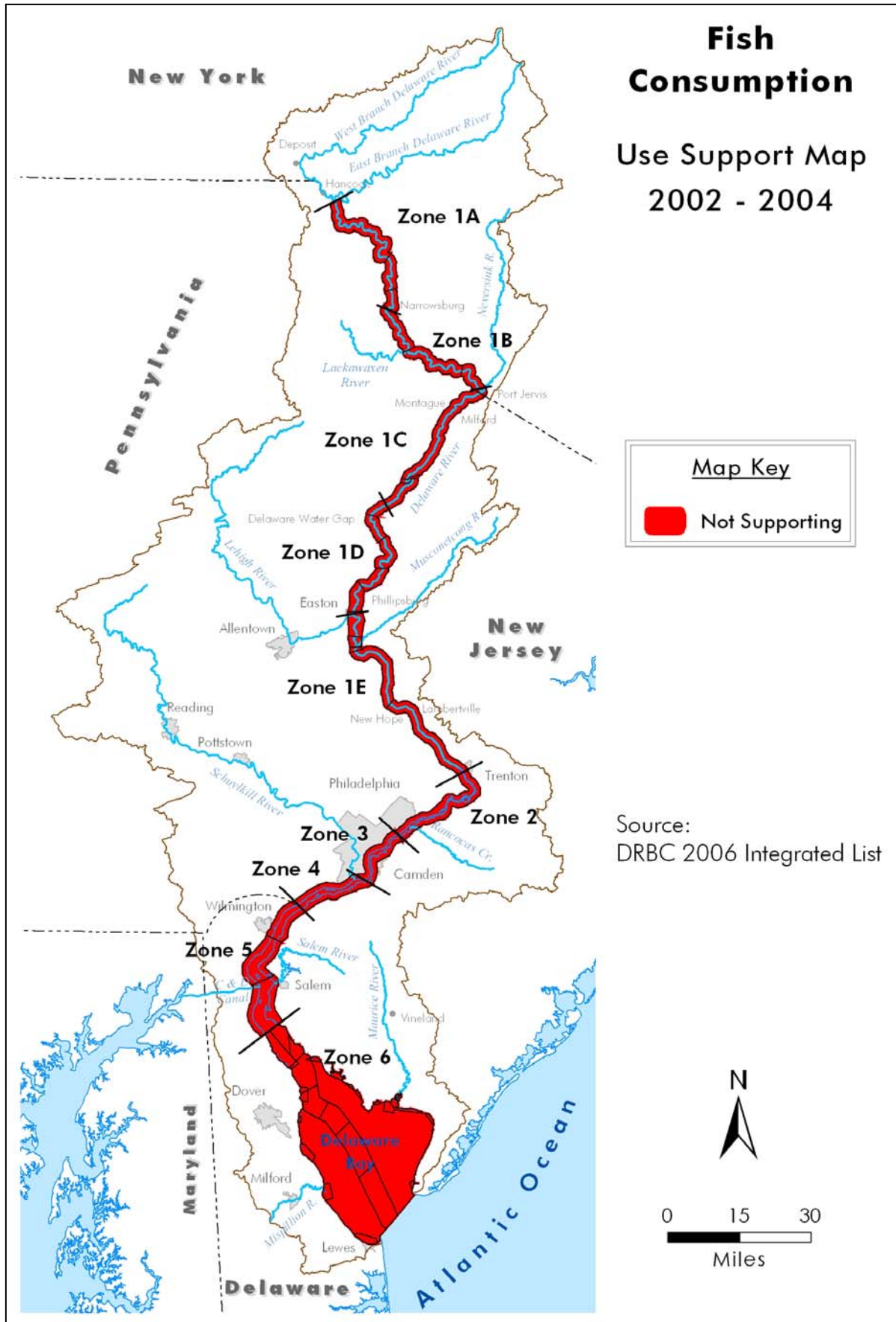
Table 3.16: Fish Consumption Advisories for the Delaware River: New Jersey (for Mercury)^a

From RM	To RM	Locations	Species	General Advisory	High Risk Advisory ^b
253.60	0.00	Statewide	Largemouth & Smallmouth Bass, Chain Pickerel	1 meal/week	1 meal/month
			Brown Bullhead	No Restrictions	1 meal/month
			Yellow Bullhead & Sunfish	No Restrictions	1 meal/month
253.60	209.50	Delaware River upstream of Water Gap	Smallmouth Bass	1 meal/week	1 meal/month
			Channel Catfish	No Restrictions	1 meal/month
			Muskellunge		
209.50	184.60	Delaware River from Water Gap to Phillipsburg	White Catfish	1 meal/week	Do Not Eat
			Channel Catfish	No Restrictions	1 meal/month
			Smallmouth Bass		
			Walleye	No Restrictions	1 meal/week
184.60	131.96	Delaware River, Phillipsburg to Trenton	Channel Catfish	1 meal/week	1 meal/month
			Largemouth Bass	No Restrictions	1 meal/month
			Smallmouth Bass	No Restrictions	1 meal/week
131.96	100.12	Delaware River Trenton to Camden	Largemouth Bass & White Catfish	No Restrictions	1 meal/week
100.12	78.74	Delaware River Camden to Delaware State Line	Hybrid Striped Bass	No Restrictions	1 meal/week

^a A Guide to Health Advisories for Eating Fish and Crabs Caught in New Jersey Waters, 2005

^b High-risk individuals are Infants, children, pregnant women, nursing mothers and women of childbearing age

Figure 3.8: Fish Consumption Use Support in the Delaware River and Bay, 2000-2002



Shellfish Consumption Designated Use

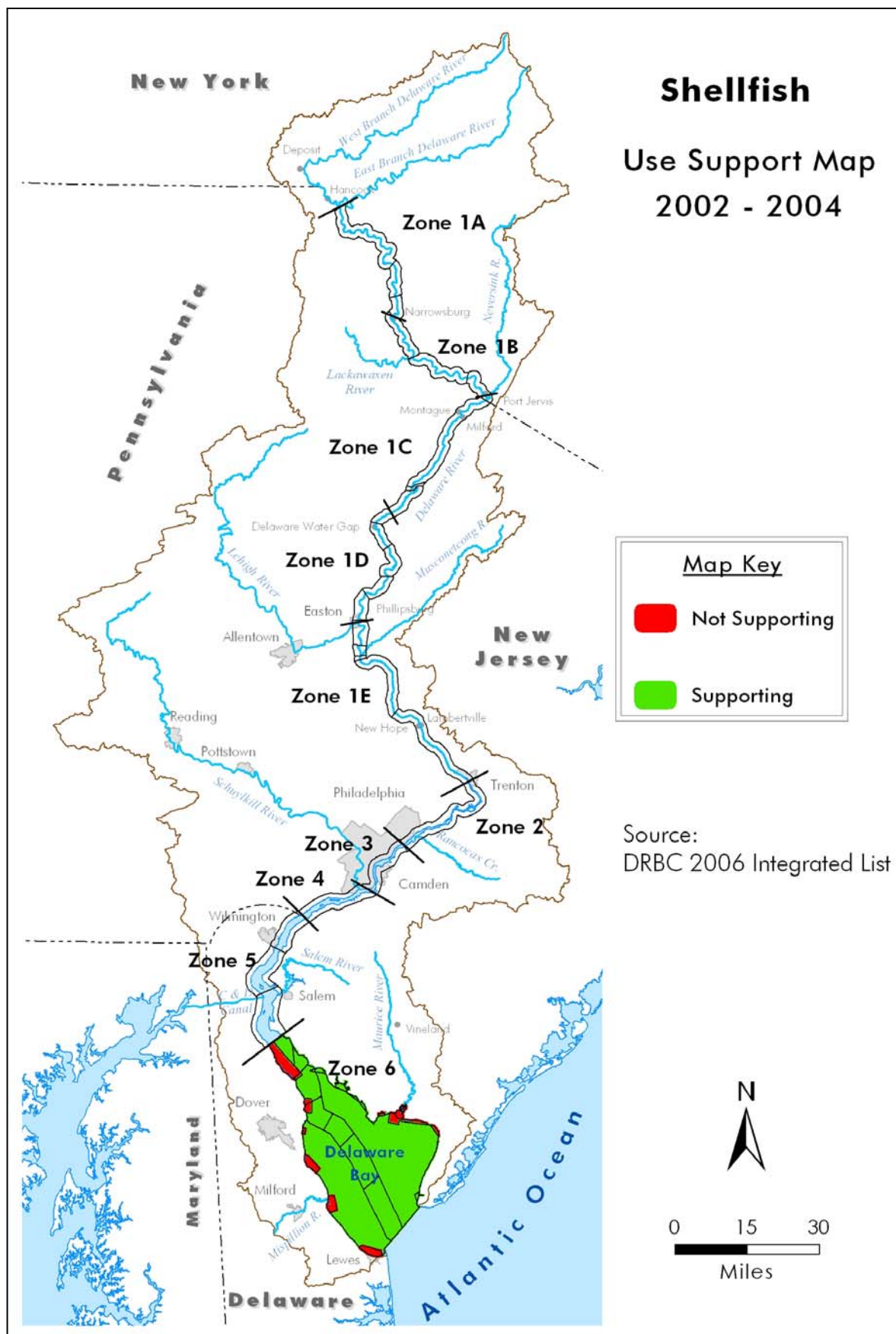
DRBC classifies only Zone 6 for the shellfish consumption use. In Zone 6, a criterion is set such that Total Coliform (Most Probable Number or MPN) is not to exceed federal shellfish standards in designated shellfish areas. Because both the states of Delaware and New Jersey monitor and assess water quality for suitability for shell fishing based upon the same set of federal guidelines, the reader is referred to the most recent water quality assessment reports of those states for an assessment of the shellfish consumption use.

The State of Delaware classifies its designated shellfish waters as falling into the following categories; Approved, Seasonally Approved, Prohibited Shellfish Harvesting and Resource Protection Area, or Prohibited. New Jersey classifies shellfish waters as falling into the following categories; Unrestricted, Special Restricted, Seasonal, and Prohibited (either due to water quality or to administrative closures).

For this assessment, Prohibited waters were considered to be Not Supporting the use, while all other harvesting areas were considered to be Supporting the use. Figure 3.9 indicates the use support for shellfishing in Zone 6. In total, 642 square miles (93% of Zone 6) were in Full Support and 51 square miles (7% of Zone 6) were Not Supporting the use. For Shellfish Consumption, the entirety of Zone 6 (693 square miles) was assessed.

It is important to note that both the States of Delaware and New Jersey do not list all prohibited or provisionally approved waters as impaired waters, as not all restrictions on shellfish harvesting are due to water quality issues. Please see Delaware's and New Jersey's 2006 Integrated List Reports for more information.

Figure 3.9: Shellfish Consumption Use Support in Delaware Bay, 2002-2004



Recreational Designated Use

The determination of Recreational Use support in this assessment is based upon bacterial data. DRBC standards for bacteria are based upon a geometric mean such that, for areas where Fecal Coliform bacteria are used as indicators, a maximum geometric mean of 200 colonies per 100 ml is permitted. Some exceptions to this criterion are present in the standards, however. In Zone 3 and Zone 4 (above RM 81.8) the limit is 770 colonies per 100 ml and secondary contact recreation is the designated use. In sections of the River where Enterococcus is another indicator (Zones 2-6), a maximum geometric mean of 33 colonies per 100 ml is the criterion for primary contact recreation in fresh waters. In marine waters (Zones 5 and 6), the Enterococcus criterion is 35 colonies per 100 ml for primary contact recreation. Secondary contact recreation in fresh waters requires no more than 88 colonies per 100ml.

Figure 3.10 shows the level of use support for Recreation, which was assessed along the length of the Delaware River from Hancock, NY to the bottom of Zone 1 (202 miles), in Zones 2-5 of the Delaware Estuary (97 square miles), and in Delaware Bay (686 square miles).

Non-Tidal River

The recreation use was supported in 162 miles (80%) of the non-tidal Assessment Units. The remaining reaches of River were either not supporting the use or had insufficient data to assess the use. Table 3.17 explains the rationale behind the assessment decisions in those assessment units.

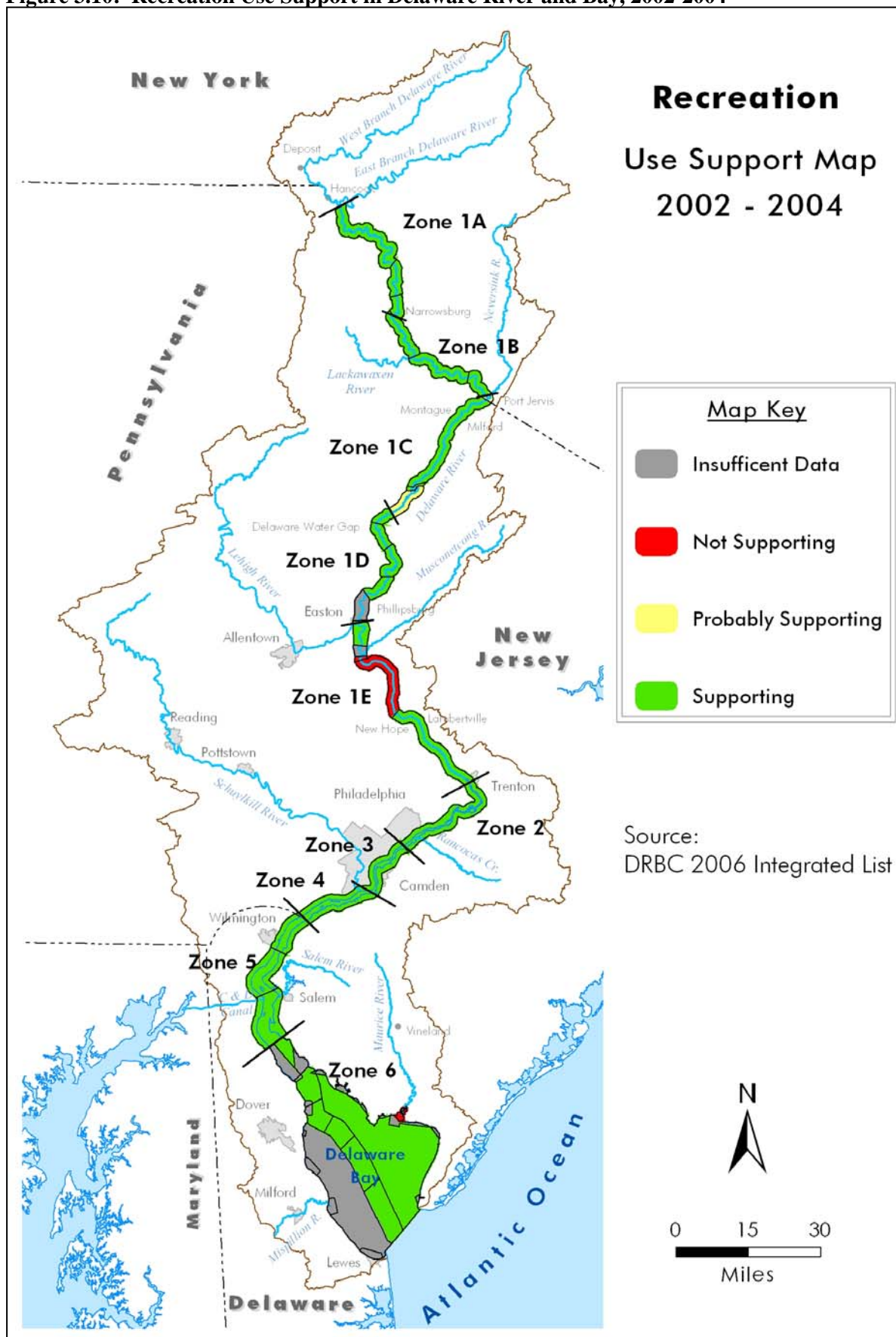
Table 3.17: Non-Tidal Assessment Units Not Assessed as Supporting the Recreation Designated Use

AU	Use Support Level	Explanation
1C1	Probably Supported	No readily available data, but 1B3 and 1C2 are supporting this use
1C4	Probably Supported	No readily available data, but 1C3 and 1D1 are supporting this use
1D5	Insufficient Data	No readily available data
1D6	Insufficient Data	No readily available data
1E2	Insufficient Data	No readily available data
1E3	Not Supported	Geometric mean for 2004 samples was 224/100ml
1E4	Not Supported	Geometric mean for 2004 samples was 228/100ml

Estuary

The use was supported in Estuary zones 2-5 (97 square miles, or 100% of the Estuary, excluding the Bay) and in all assessable portions of the Bay except for three square miles in 6nj8. In other words, the use was supported in 438 square miles, or 63% of the Bay. All other Bay assessment units could not be assessed for recreation, according to DRBC water quality standards, because of a lack of readily available Enterococcus or Fecal Coliform bacterial data.

Figure 3.10: Recreation Use Support in Delaware River and Bay, 2002-2004



Drinking Water Designated Use

The assessment of the Drinking Water designated use, in this assessment, is based upon levels of toxic substances, Total Dissolved Solids or TDS (secondary drinking water standards, or maximum of 500 mg/L applies for this use), Hardness and Chlorides. Zones 1A-E, 2 and 3 are designated for drinking water use, or a total of 202 main stem river miles and 14 square miles of Estuary.

Figure 3.11 shows the level of drinking water use attainment for the various segments of the main stem Delaware River based upon an analysis of the parameters mentioned above. Note that Alkalinity, Chlorides, and Hardness criteria are not set for Zones 1A-E in the River.

The Drinking Water designated use was assessed along the length of the Delaware River from Hancock, NY (RM 335.5) down to the bottom of Zone 1 (202 miles) and in Zones 2 and 3 (14 square miles). This is equal to 100% of the main stem River and Estuary that are designated for that use.

Non-Tidal River

In Zones 1A-E, use support was based upon Turbidity and Total Dissolved Solids data. The use was supported in all Zones except those in Table 3.18.

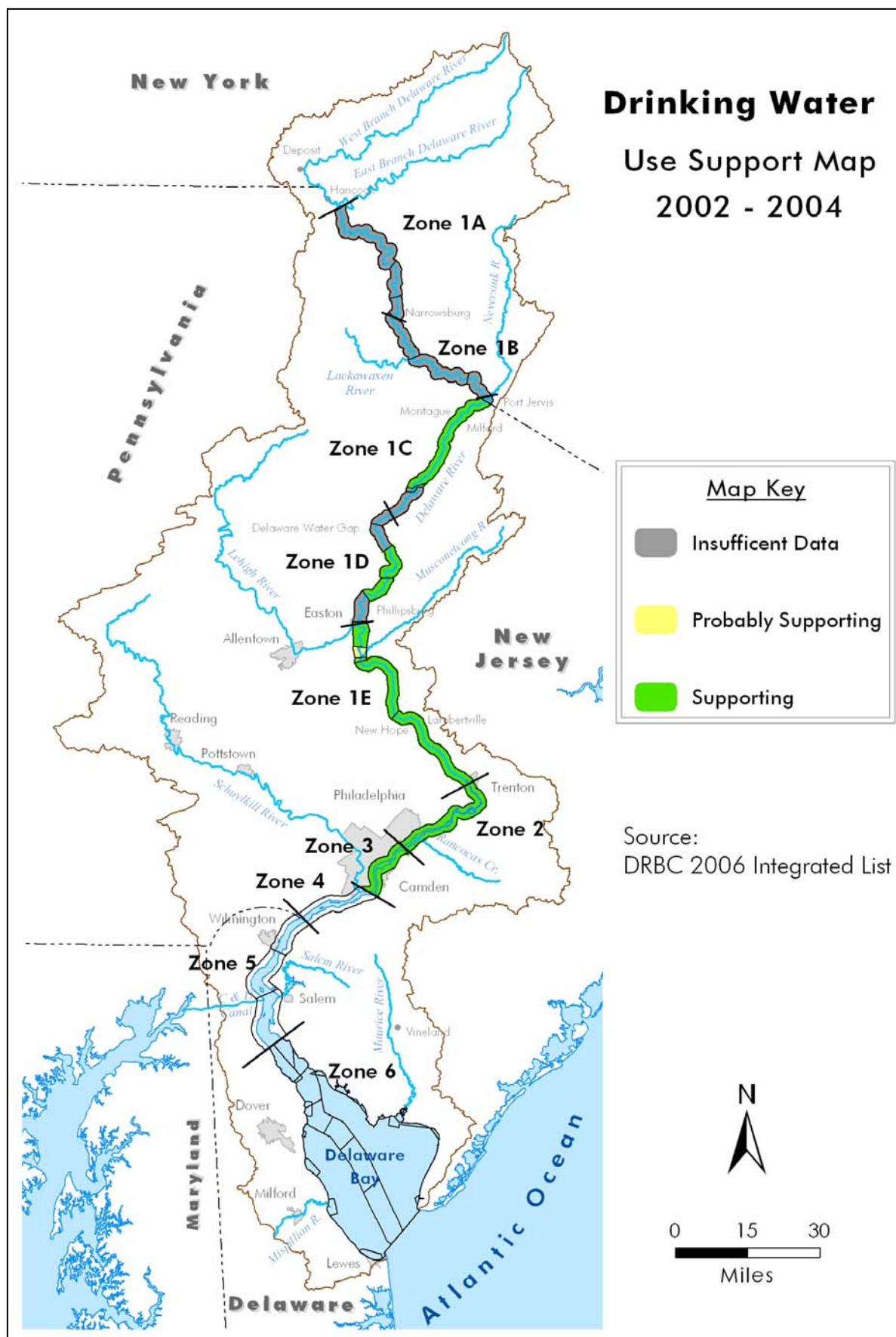
Table 3.18: Non-Tidal Assessment Units Not Assessed as Supporting the Drinking Water Designated Use

AU	Use Support Level	Rationale
1A1-1A3	Insufficient Data	No readily available Total Dissolved Solids data
1B1-1B3	Insufficient Data	No readily available Total Dissolved Solids data
1C1	Insufficient Data	No readily available Total Dissolved Solids data
1C3, 1C4	Insufficient Data	No readily available Total Dissolved Solids data
1D1, 1D2	Insufficient Data	No readily available Total Dissolved Solids data
1D5, 1D6	Insufficient Data	No readily available Total Dissolved Solids data
1E2	Probably Supported	No readily available data but 1E1 and 1E3 support this use

Estuary

In Zones 2 and 3 (15 square miles, or 100% of the designated area in the Estuary) the drinking water use was assessed as Supported.

Figure 3.11: Drinking Water Use Support in Delaware River and Estuary, 2002-2004



Final Categorization of Assessment Units

Figure 3.12 represents the Integrated List categories into which each of the AUs belongs. The results of this assessment indicate that the vast majority of the Delaware River and Bay is in Category 5, not supporting one or more uses and requiring a TMDL. In some cases, non-support of the Fish Consumption designated use was the only cause of a water body being placed in Category 5. Most parts of the River and Bay are affected by fish consumption advisories.

Figure 3.12: Categorization of AUs of the Delaware River and Bay, 2002-2004

